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EXAMINER	
YANG, NELSON C	

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1641	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/930,352	CUNNINGHAM ET AL.	
	Examin r	Art Unit	
	Nelson Yang	1641	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 August 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-153* is/are pending in the application.

4a) Of the above claim(s) *20-50,53-58,70,75-99,102-109 and 126-128* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19,51,52,59-69,71-74,100,101,110-125 and 129-146* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☒ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 1-19, 51, 52, 59-69, 71-74, 100, 101, 110-125, 129-146, filed on August 28, 2003, is acknowledged.

Claims 20-50, 53-58, 70, 75-99, 102-109, 126-128, 147-153 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse.

Claim Objections

2. Claims 51, 52, 59, 67 are objected to because of the following informalities: the claims depend from non-elected claims. Appropriate correction is required.

3. Claim 101 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 101 is directed to a method of attaching a biosensor to a microtiter plate, whereas the parent claim, claim 101, is directed to the biosensor itself.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-19, 60-65, 68, 69, 100, 101, 110-125, 129-146, are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 1 recites the limitation "the reflected radiation spectrum" in line 9. There is insufficient antecedent basis for this limitation in the claim.

7. The term "high" in claim 1 is a relative term which renders the claim indefinite. The term "high" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is unclear whether any of the values 0.1, 1.0, etc, would be considered a "high refractive index". This is also applicable to the use of the term "high" in claims 110, 114, 116, 129, 133, and 135.

8. The term "narrow" in claim 2 is a relative term which renders the claim indefinite. The term "narrow" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is unclear whether the range applicant is indicating by the term "narrow" includes just a single wavelength or half the entire spectrum. This is also applicable for the use of the term "broad" in the same claim, and also to the use of the terms "narrow" and "broad" in claims 111 and 130

9. Claim 3 recites the limitation "the substrate" in the first line. There is insufficient antecedent basis for this limitation in the claim.

10. Claim 13 recites the limitation "the group" in the second line. There is insufficient antecedent basis for this limitation in the claim.

11. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 13 recites the broad recitation biological samples, and the claim also recites nucleic acids, polypeptides, antigens, polyclonal antibodies, monoclonal antibodies, single chain antibodies, etc. which are narrower statements of the range/limitation.

12. Claim 51 recites the limitation "second collection fiber probe" in lines 4-5. There is insufficient antecedent basis for this limitation in the claim. There is no mention of a first collection fiber probe.

13. Claim 60 recites the limitation "about 50 to about 1000 individual biosensors". The use of the term "about" renders the limitation unclear as to what range is actually being encompassed. For example, it is unclear whether this range would include compositions of 40 biosensors or 10001 biosensors. This is also applicable to the use of the term "about" in claims 61-65.

14. Claim 68 recites the limitation of having biosensors fabricated into the tip of the probe, which would suggest that the biosensors are not on the surface of the probe, but rather are inside the probe, rendering it unclear how the biosensor is capable of detecting the analyte. The claim is currently interpreted as "fabricated on the tip of the probe".

15. Claim 68 recites the limitation of having biosensors fabricated into the tip of the probe, while claim 69 recites the limitation of having biosensors attached onto the tip of the probe. It is unclear what the distinction is between fabricating and attaching in this situation, and applicant fails to clearly define the terms in the specification, rendering the claims ambiguous. Currently, the two terms are interpreted as having the same meaning.

16. Claim 101 recites the phrase "bottomless microtiter plate" which could mean either having no bottom or having no limitations or bounds, rendering the claim somewhat ambiguous.

17. The remainder of the claims are deemed indefinite due to their dependence on an indefinite claim.

Claim Rejections - 35 USC § 102

18. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

19. Claims 1-3, 5, 8-10, 12-16, 19, 100, 110-112, 114, 115, 117-119, 122, 129-131, 133, 134, 136, 138, 139, 140, 143, are rejected under 35 U.S.C. 102(b) as being anticipated by Layton et al [US 4,931,384].

20. With respect to claims 1, 110, 114, 129, 133, Layton et al teaches an invention, comprising a substrate having a pre-formed surface which is optically active with respect to radiation at least over a predetermined band of wavelengths, and at least a predetermined part of which pre-formed surface is coated with a thin film of a material capable of binding a predetermined chemical, biochemical or biological species. The pre-formed surface is preferably a grating. A single grating may be employed, or the surface may comprise two or more gratings disposed mutually at an angle. Where there are two such gratings, they may be mutually orthogonal. The profile of each grating is advantageously square-wave or sinusoidal. Saw-tooth profiles are also possible, but are not presently preferred (column 1, lines 40-56).

21. With respect to claim 2, 111, 130, Layton et al teaches the feature of a grating (column 1, lines 40-56). Gratings will inherently reflect a narrower band of optical wavelengths when illuminated with a band of optical wavelengths, as in any particular direction, only those waves of a given wavelength will be conserved, all the rest being destroyed because of interference with one another.

22. With respect to claim 3, 112, 115, 131, 134, Layton et al teaches the use of a substrate formed of a plastics material (column 2, lines 26-27).

23. With respect to claims 5, 136, Layton et al teaches an assay technique for qualitative and quantitative detection of a chemical, biochemical or biological species in a sample, which comprising coating at least a predetermined part of a surface having a pre-formed single diffraction grating or two or more gratings disposed mutually at an angle provided on a substrate with a thin film of a material capable of binding the species to be assayed, said surface suppressing the transmission of zero-order diffracted light at least over a predetermined band of

wavelengths; (claims 1, 4). Layton specifically teaches a substrate where the active (upper) surface of the substrate is covered by a passive film of aluminium oxide. A monomolecular layer of antigen molecules is covalently bonded to the film of aluminium oxide and is thus immobilized (column 6, lines 11-25).

24. With respect to claim 8, 119, 140, Layton et al teaches the use of three ranges of surface depth (peak-to-trough measurements). In the first, the grating or protuberance or each of the gratings or protuberances, in the event several are employed, have a depth in the range 10 to 50 nanometers. In the second, the depth is in the range 50 to 200 nanometers; and in the third, the depth is in the range 200 to 2000 nanometers. Layton et al further teaches that the first of these ranges, the pitch (period) of the each grating(s) or the periodicity of the protuberances is advantageously greater than their depth; the structure thus corresponds, in general, to that of a shallow grating. With the second and third ranges, the pitch (period) of each grating or the periodicity of the protuberances is advantageously of the same order as their depth (column 2, lines 1–18).

25. With respect to claim 9, Layton et al teaches an article including a plurality of zones each of which is coated with a different receptive material so that the article is capable of binding a plurality of different species (claim 81).

26. With respect to claims 10, 114, Layton et al teaches a monomolecular layer of antigen molecules covalently bonded to the film of aluminium oxide and is thus immobilized (column 6, lines 15-25).

27. With respect to claim 12, Layton et al teaches a layer of antibodies 14 attached to the antigen layer. Furthermore, isolated antigens have been bound by antibodies (column 6, lines 23-30).

28. With respect to claims 13-16, Layton et al teaches the use of antibodies as a binding substance (column 6-lines 15-30). Since claims 14-16 merely expand the Markush group of claim 13, they are also rejected.

29. With respect to claims 19, 122, 143, Layton et al teaches that observations in the method of this invention may use polarized light. In one particular technique, the optical properties of the surface are observed by monitoring the angular position at which there occurs a sharp reduction (dip) in reflection as the surface is observed (detector) or scanned with polarized radiation of a predetermined wavelength (light source). The radiation used is light, and the polarization should be transverse to the grooves of the grating (column 3, line 53-column 4, line 5).

30. With respect to claim 100, Layton specifically teaches a substrate where the active (upper) surface of the substrate is covered by a passive film of aluminium oxide, which is dielectric. A monomolecular layer of antigen molecules is covalently bonded to the film of aluminium oxide and is thus immobilized (column 6, lines 11-25).

31. With respect to claim 117, 118, 138, 139 Layton et al teaches the use of two gratings that are mutually orthogonal, resulting in a two-dimensional grating with a repeating pattern of squares, forming a rectangular grid (column 1, lines 49-56).

Claim Rejections - 35 USC § 103

32. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

33. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Layton et al [US 4,931,384]. Although Leyton et al teaches an array of distinct locations, as discussed above in paragraphs 25-27, Leyton et al fails to recite the specific feature of the distinct locations defining microarray spots in the range 50-500 microns in diameter. However, it would have been obvious for a person of ordinary skill in the art to use an array of distinct locations defning microarray spots within this particular range of 50-500 microns in diameter, because it has long been settled to be no more than routine experimentation for one of ordinary skill in the art to discover an optimum value of a result effective variable. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum of workable ranges by routine experimentation." Application of Aller, 220 F.2d 454, 456, 105 USPQ 233, 235-236 (C.C.P.A. 1955). "No invention is involved in discovering optimum ranges of a process by routine experimentation." Id. At 458, 105 USPQ at 236-237. The "discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." Application of Boesch, 617 F.2d 272, 276, 205 USPQ 215, 218-219 (C.C.P.A. 1980). Since applicant has not disclosed that the specific limitations recited in instant claims 11 are for any particular purpose or solve any stated problem and the prior art teaches an array of distinct locations, absent unexpected results, it would have been obvious for one of ordinary skill to

discover the optimum workable diameters of the distinct locations in the array disclosed by Layton et al by normal optimization procedures known in the art.

34. Claims 6,7, and 137 are rejected under 35 U.S.C. 103(a) as being unpatentable over Layton et al [US 4,931,384] in view of Rosenblatt [US 5,337,183].

Layton et al teaches the use of a biosensor comprising a grating with an aluminum oxide coating. Layton et al does not teach the use of a cover layer comprised of glass, epoxy, and plastic. Rosenblatt, however, teaches the use of a cover layer of sputtered glass or semiconductor layer to cover the grating in order to provide protection and modify the propagation characteristics of the plasmon (column 12, lines 10-15). Therefore it would be obvious to use a cover layer of sputtered glass or semiconductor layer to cover the grating in the biosensor of Layton, as taught by Rosenblatt, in order to provide protection and modify the propagation characteristics of the plasmon.

35. Claims 120, 121, 141, 142 are rejected under 35 U.S.C. 103(a) as being unpatentable over Layton et al [US 4,931,384] in view of Daniell [US 6,587,276].

Layton et al teaches the use of a two dimensional grating as discussed in above paragraphs 18-31. Layton et al does not teach the use of anti-reflective "moth-eye" structures. Daniell, however, teaches that performance would be further optimized and economized by the use of hybrid refractive/diffractive surfaces and anti-reflective "moth-eye" microstructures. In production, AR relief structures would typically be more cost-effective than coating, and would improve the saturation and contrast of the observed image. The enclosed internal optical surfaces could use high aspect-ratio subwavelength AR microstructures which might be subject

to degradation if formed on an external surface. The outer array surface might be formed with a similar but more robust AR microstructure topology (column 6, lines 3-13). Therefore, it would be obvious to use anti-reflective "moth-eye" structures in the biosensor of Layton et al, as taught by Daniell, in order to further optimize and economize performance.

36. Claims 4, 113, 116, 132, 135, are rejected under 35 U.S.C. 103(a) as being unpatentable over Layton et al [US 4,931,384] in view of Lenau (Torben Lenau, *Material: Silicon nitride*, 1996, 97, 98).

Although Layton et al teaches a grating (a preformed surface) comprised of an inorganic oxide or a layer thereof (column 2, lines 37-58), Layton et al does not specifically teach a two-dimensional grating comprised of a material selected from the group consisting of zinc sulfide, titanium dioxide, tantalum oxide and silicon nitride. It would be obvious for a person of ordinary skill in the art to use a grating comprising of silicon nitride, as Lenau teaches that silicon nitride is a dielectric material that is light, hard, resistant to corrosion and deformation at room and elevated temperatures (Torben Lenau , *Material: Silicon nitride*, 1996, 97, 98). Therefore it would be obvious to have the two-dimensional grating of Layton et al be comprised of silicon nitride, as taught by Lenau, since silicon nitride is light, hard, resistant to corrosion and deformation at room and elevated temperatures

37. Claims 17, 18, 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walt et al [US 6,377, 721] in view of Layton et al [US 4,931,384].

Walt et al teaches a biosensor comprising microwells formed at the distal end of individual fibers within a fiber optic array (microtiter plate). The biosensor array utilizes an

optically interrogatable encoding scheme for determining the identity and location of each cell type in the array and provides for simultaneous measurements of large numbers of individual cell responses to target analytes. The biosensor array and measurement method may be employed in the study of biologically active materials, in situ environmental monitoring, monitoring of a variety of bioprocesses, and for high throughput screening of large combinatorial chemical libraries (abstract, claims 1-10). Walt et al does not teach a biosensor with a two-dimensional grating comprised of a material having a high refractive index, where when the biosensor is illuminated a resonant grating effect is produced on the reflected radiation spectrum. Layton et al, however, does teach the use of such biosensors, as discussed in above paragraphs 16-28. Layton et al further teaches that the use of selectively coated two-dimensional gratings would enable quantitative detection of specific antigens as an aid to diagnosis (column 5, lines 13-15). Therefore it would be obvious to use the 2-dimensional gratings, as taught by Layton et al, in the biosensor of Walt et al, in order to enable quantitative detection of specific antigens, as an aid to diagnosis.

38. Claims 17, 18, 51, 52, 59, 66-69, 101, 123-125, 144-146 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pinkel et al [US 6,146,593] in view of Layton et al [US 4,931,384].

Pinkel et al, teaches a detection system comprising a biosensor, and fiber probes connected to a detector, light source and each other. Specifically, Pinkel et al teaches a biosensor comprise a multiplicity of optical fibers bundled together to form an optical fiber array. The sensor end of each optical fiber or group of optical fibers comprising the optical fiber array bear a particular species of biological binding partner (abstract). Pinkel et al teaches a microtiter plate

with sensors attached at the bottom (sensor array) (figure 4) and the use of the biosensor in a comparative genomic hybridization process (figure 5), both which involve the use of the biosensor as an internal surface. Pinkel et al, however, does not teach a biosensor with a two-dimensional grating comprised of a material having a high refractive index, where when the biosensor is illuminated a resonant grating effect is produced on the reflected radiation spectrum. Layton et al, however, does teach the use of such biosensors, as discussed in above paragraphs 18-31. Layton et al further teaches that the use of selectively coated two-dimensional gratings would enable quantitative detection of specific antigens as an aid to diagnosis (column 5, lines 13-15). Therefore it would be obvious to use the sensor of Layton et al in the system of Pinkel et al, in order to enable quantitative detection of specific antigens, as an aid to diagnosis.

With respect to claim 51, Pinkel et al the use of fiber probes where each fiber has a sensor end and a transmission end and the fibers in each group are oriented so that the sensor ends are commonly aligned. Each group of fibers is then treated to attach a single species of biological binding partner to the sensor ends of the constituent fibers (column 3, lines 27-38). Pinkel et al further teaches that the light source may be external to the biosensor or may be provided as an integral component. In one embodiment, some of the constituent optical fibers will conduct light from the signal and/or reference source to the sensor face. For maximum sensitivity the light used to measure absorbance, or absorption spectrum, changes will be directed directly at the sensor face of the biosensor (column 14, lines 15-34). Pinkel et al fails to disclose the use of three fiber probes to form one long fiber probe sensor. It would have been obvious, however, to a person of ordinary skill in the art at the time the invention was made to form the sensor from three individual fiber probes, since it has been held that constructing a formerly integral

structure in various elements involves only routine skill in the art. *Nerwin v. Erlichman,* 168 USPQ 23 (CCPA 1952). Furthermore, it has been held that forming in one piece an article which has formerly been formed in two pieces and put together involves only routine skill in the art. *Howard v. Detroit Stove Works,* 150 U.S. 164 (1893).

39. With respect to claim 52, Pinkel et al teaches that optical signals produced by binding of an analyte to a biological binding partner are conducted along the respective optical fibers to a transmission end which may be attached to a detector. Detection of the signal from the fibers corresponding to each species of biological binding partner provides a simultaneous measurement of the binding of a multiplicity of analytes. Each fiber has a sensor end and a transmission end and the fibers in each group are oriented so that the sensor ends are commonly aligned. Each group of fibers is then treated to attach a single species of biological binding partner to the sensor ends of the constituent fibers. Alternatively, a multiplicity of species of biological binding partner may be attached to each group as long as the multiplicity of species of biological binding partners attached to one fiber group is different than the multiplicity of species attached to the other fiber groups (column 3, lines 27-38). Pinkel et al further teaches that biosensors comprising a biological "binding molecule" attached to an optical fiber are well known in the prior art, most typically as evanescent wave detectors and that, in order to maximize sensitivity and selectivity, biosensors typically utilize a single species of biological binding molecule affixed to the face of the sensor. (column 1, lines 53-67).

40. With respect to claim 59, 66, Pinkel et al also teaches the use of a holding fixture (optical fibers) in order to fabricate a sensor bearing a plurality of uniquely addressed "detection

moieties". Pinkel et al further teaches that the biosensor is attached to the bottom of a microtiter plate. (column 2, lines 50-67, column 11, lines 26-54).

41. With respect to claim 67-69, Pinkel et al teaches that a biosensor composition comprised of biosensors on a tip of a multi-fiber optical probe (abstract, column 3, lines 27-38)

42. With respect to claim 101, Pinkel et al teaches a biosensor attached to the bottom of a microtiter plate. Since the claim is directed to a biosensor, and not the method of making the biosensor, no patentable weight is given to how the biosensor is attached to the microtiter plate (figure 4, column 5, lines 54-60)

43. With respect to claim 123, 144, Pinkel et al teaches a detection system comprising a biosensor, and fiber probes connected to a detector, light source and each other. Specifically, Pinkel et al teaches a biosensor comprise a multiplicity of optical fibers bundled together to form an optical fiber array. The sensor end of each optical fiber or group of optical fibers comprising the optical fiber array bear a particular species of biological binding partner. Optical signals produced by binding of an analyte to a biological binding partner are conducted along the respective optical fibers to a transmission end which may be attached to a detector. Detection of the signal from the fibers corresponding to each species of biological binding partner provides a simultaneous measurement of the binding of a multiplicity of analytes. Each fiber has a sensor end and a transmission end and the fibers in each group are oriented so that the sensor ends are commonly aligned. Each group of fibers is then treated to attach a single species of biological binding partner to the sensor ends of the constituent fibers. Alternatively, a multiplicity of species of biological binding partner may be attached to each group as long as the multiplicity of

species of biological binding partners attached to one fiber group is different than the multiplicity of species attached to the other fiber groups (column 3, lines 27-38).

44. With respect to claim 124, 145, Pinkel teaches that the illuminating fiber and the collecting fiber are the same fiber. Pinkel et al teaches that the excitation illumination may be provided by an integral component of the biosensor or by a separate light source according to a number of methods well known to those of skill in the art. Evanescent wave systems involve introducing a light beam at the transmission end of the optical fiber. This light beam is conducted along the fiber until it reaches the sensor end of the fiber where it generates in the test solution an electromagnetic waveform known as the evanescent wave component. The evanescent wave component may be sufficient to excite a fluorophore and produce a fluorescent signal (column 14, lines 39-51).

45. With respect to claim 125, 146, Pinkel et al teaches a system where the light source illuminates the array of polynucleotides from its top or bottom surface (figure 4).

46. Claims 60-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pinkel et al [US 6,146,593] and Layton et al [US 4,931,384].

The biosensor composition of Layton et al and Pinkel et al as discussed above in paragraphs 39-46 fails to recite the specific feature of 50-1000 individual biosensors. However, it would have been obvious for a person of ordinary skill in the art to use a biosensor composition within this particular number, because it has long been settled to be no more than routine experimentation for one of ordinary skill in the art to discover an optimum value of a result effective variable. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum of workable ranges by routine experimentation."

Application of Aller, 220 F.2d 454, 456, 105 USPQ 233, 235-236 (C.C.P.A. 1955). "No invention is involved in discovering optimum ranges of a process by routine experimentation." Id. At 458, 105 USPQ at 236-237. The "discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." Application of Boesch, 617 F.2d 272, 276, 205 USPQ 215, 218-219 (C.C.P.A. 1980). Since applicant has not disclosed that the specific limitations recited in instant claims 60-63 are for any particular purpose or solve any stated problem and the prior art teaches the use of multiple biosensors associated with a holding fixture (optical fibers), absent unexpected results, it would have been obvious for one of ordinary skill to discover the optimum workable ranges of the biosensor composition disclosed by Leyton et al and Pinkel et al by normal optimization procedures known in the art.

47. Claims 64-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pinkel et al [US 6,146,593] and Layton et al [US 4,931,384].

The biosensor composition of Layton et al and Pinkel et al as discussed above in paragraphs 39-47 fails to recite the specific feature of about 1 to about 5 mm^2 and 3 mm^2. However, it would have been obvious for a person of ordinary skill in the art to use a biosensor composition within this particular measurement, because it has long been settled to be no more than routine experimentation for one of ordinary skill in the art to discover an optimum value of a result effective variable. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum of workable ranges by routine experimentation." Application of Aller, 220 F.2d 454, 456, 105 USPQ 233, 235-236 (C.C.P.A. 1955). "No invention is involved in discovering optimum ranges of a process by routine experimentation." Id. At 458, 105 USPQ at 236-237. The "discovery of an optimum value of a result effective

variable in a known process is ordinarily within the skill of the art." Application of Boesch, 617 F.2d 272, 276, 205 USPQ 215, 218-219 (C.C.P.A. 1980). Since applicant has not disclosed that the specific limitations recited in instant claims 64-65 are for any particular purpose or solve any stated problem and the prior art teaches the use of multiple biosensors associated with a holding fixture (optical fibers), absent unexpected results, it would have been obvious for one of ordinary skill to discover the optimum workable ranges of the biosensor composition disclosed by Leyton et al and Pinkel et al by normal optimization procedures known in the art.

48. Claim 51 rejected under 35 U.S.C. 103(a) as being unpatentable over Pinkel et al [US 6,146,593] and Layton et al [US 4,931,384] as applied to claims 17, 18, 51, 52, 59-69, 101, 123-125, 144-146 above, and further in view of Saaski et al [US 5,606,170].

Pinkel et al and Layton et al do not teach the a detection system comprised of a first fiber probe connected to a detector and a second fiber probe connected to a light source and both connected to a third fiber probe. Saaski et al, however, teaches that an improved intrinsic optical sensor which may capture more of the sensor modulated return light generated by the sensor's intrinsic sensing fiber, for greater sensitivity, than may be the case with conventional intrinsic optical sensors. One form of such an improved intrinsic optical sensor may comprise a ribbon-like intrinsic optical sensing fiber. Such an optical sensor may further comprise a ribbon-like sensor fiber having a cross-sectional larger than that of the ribbon-like sensing fiber, and a transition fiber connecting such ribbon-like sensor and sensing fibers. With such a ribbon-like sensing fiber, the excitation fiber and the array of return light fibers may be positioned in a linear arrangement, with the excitation fiber being located in the central portion of the linear

arrangement (column 2, lines 40-49). Therefore, it would be obvious to have in the detection system taught by Pinkel et al and Layton et al a first fiber probe connected to a detector and a second fiber probe connected to a light source and both connected to a third fiber probe, as taught by Saaski et al.

49. Claims 71, 72, 74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goodman et al [US 6,316,153] in view of Layton et al [US 4,931,384].

Goodman et al teaches devices with a combination of enzymes, motile proteins and optical properties that may be used for biosensor applications (column 19, lines 1-10). Specifically, Goodman et al teaches a laser source, an optical system, a galvanometer, and a light detector (column 19, lines 11-21). Goodman et al,however, does not teach a biosensor with a two-dimensional grating comprised of a material having a high refractive index, where when the biosensor is illuminated a resonant grating effect is produced on the reflected radiation spectrum. Layton et al, however, does teach the use of such biosensors, as discussed in above paragraphs 18-31. Layton et al further teaches that the use of selectively coated two-dimensional gratings would enable quantitative detection of specific antigens as an aid to diagnosis (column 5, lines 13-15). Therefore it would be obvious to use the biosensor taught by Layton et al, in the detection system of Goodman et al, in order to enable quantitative detection of specific antigens, as an aid to diagnosis.

50. With respect to claims 74, the laser is a diode laser with a wavelength of 785 nm (column 19, example 1).

51. Claim 73 is rejected under 35 U.S.C. 103(a) as being unpatentable over Goodman et al [US 6,316,153] and Layton et al [US 4,931,384].

The detection system of Goodman et al and Layton et al as discussed above in paragraphs 49-50 fails to recite the specific feature of a galvanometer with a mechanical scan angle in the range 10-20 degrees. However, it would have been obvious for a person of ordinary skill in the art to use a mechanical scan angle within this particular range of 10-20 degrees, because it has long been settled to be no more than routine experimentation for one of ordinary skill in the art to discover an optimum value of a result effective variable. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum of workable ranges by routine experimentation." Application of Aller, 220 F.2d 454, 456, 105 USPQ 233, 235-236 (C.C.P.A. 1955). "No invention is involved in discovering optimum ranges of a process by routine experimentation." Id. At 458, 105 USPQ at 236-237. The "discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." Application of Boesch, 617 F.2d 272, 276, 205 USPQ 215, 218-219 (C.C.P.A. 1980). Since applicant has not disclosed that the specific limitations recited in instant claim 73 are for any particular purpose or solve any stated problem and the prior art teaches the use of a galvanometer, absent unexpected results, it would have been obvious for one of ordinary skill to discover the optimum workable ranges of the detection system disclosed by Goodman et al by normal optimization procedures known in the art.

Conclusion

52. No claims are allowed.

53. The following references are also cited as art of interest: Lee et al [US 6,404,554], Murphy et al [US 5,864,641], Bergstrom et al [US 5,242,828], Stewart [US 4,857,273], Cush et al [US 5,210,404], Shiraishi [US 5,801,390], Cush et al [US 5,210,404], Burt et al [US 6,052,213], Wells et al [US 4,958,895], Mizrahi [US 5,475,780], Holland et al [US 5,155,785], Ackley et al [US 5,170,448], Walt et al [US 5,814,524].

54. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nelson Yang whose telephone number is (703) 305-4508. The examiner can normally be reached on 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long V Le can be reached on (703) 305-3399. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0196.

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